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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/901,364	07/09/2001	Geoffrey Dearnaley	SWRI-2834	5333

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EXAMINER

OLTMANS, ANDREW L

ART UNIT	PAPER NUMBER
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1742

DATE MAILED: 04/23/2003

7

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/901,364

Applicant(s)

DEARNALEY ET AL.

Examiner

Andrew L Oltmans

Art Unit

1742

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on _____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-168 and 207-238 is/are pending in the application.
- 4a) Of the above claim(s) 169-174, 207-210, 213-216 and 219-238 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 4-10, 14-17, 19-28, 32-48, 55-66, 72-77, 90-168, 211 and 217 is/are rejected.
- 7) ☒ Claim(s) 3, 11-13, 18, 29-31, 49-54, 67-71, 78-89, 212 and 218 is/are objected to.
- 8) ☒ Claim(s) 1-168 and 207-238 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-168, 211, 212, 217 and 218, drawn to a method of treating a metal surface, classified in class 148, subclass 274, 278 and 286.
 - II. Claims 169-174, 207-210, 213-216 and 219-238, drawn to a product with a chromium gradient, classified in class 428, subclass 610.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product as claimed can be made by another and materially different process, such as simple chromating.
3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.
4. During a telephone conversation with Ms. Paula Morris on December 18, 2002 a provisional election was made with traverse to prosecute the invention of group I, claims 1-168, 211, 212, 217 and 218. Affirmation of this election must be made by applicant in replying to this Office action. Claims 169-174, 207-210, 213-216 and 219-238 have been withdrawn from

Art Unit: 1742

further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Objections

6. Claims 212 and 218 are objected to because of the following informalities:

Claims 212 and 218 are objected to for dependent upon a non-elected claim. It is further noted that claims 212 and 218 are drawn to a method, wherein the parent claim (i.e. claim 174) is a product claim. Appropriate correction is required.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 23-43, 58-66, 81-89, 95-104, 110-124, 129-140, 145-152 and 157-168 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a. Claims 23-43, 58-66, 81-89, 110-124, 129-140 and 157-168 recite a hardness in units of "GPa", wherein the claims and the specification fail to clearly establish what

method of testing (e.g. Brinell, Knoop, Rockwell, etc...) is used to determine the hardness. The specification remains silent to the type of testing and one of ordinary would not recognize "GPa" as indicating a particular hardness from the known prior art.

b. Claims 95-104 and 145-152 recite, "said sufficient quantity", but do not provide antecedent basis for the limitation "sufficient quantity". It is unclear what quantity is being limited because the term does not appear previously in the claim. Although not providing antecedent basis, the examiner notes that independent claim 1, line 10 recites similar language (claims 95-104 and 145-152 do not depend from claim 1).

c. Claims dependent upon the above claims are likewise rejected under this statute.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Yuan et al. 5,676,701

10. Claim 211 is rejected under 35 U.S.C. 102(b) as being anticipated by Yuan et al. 5,676,701 (Yuan).

Yuan teaches a Cr-containing medical implant material wherein a Cr and oxygen containing surface layer is provided as a means to reduce the initial coefficient of friction (i.e. relatively lubricious layer) (col 6):

Art Unit: 1742

33 implant applications. However, due to the relatively high
contact pressures incurred in ball-socket connections within
the confined space between adjoining vertebrae, it is pref-
erable to use a surface-hardened Cr-containing metal such as
40 that described by Davidson in U.S. Pat. No. 5,415,704. Such
alloy compositions produce minimal wear, are tolerant of
three-body abrasion, and produce a relatively lubricious
Cr/oxyhydroxide surface layer which enhances motion and
wear resistance.

[emphasis added by examiner]

The claim does not distinguish over the teachings of Yuan. The limitation that the surface has an initial coefficient of friction in an unlubricated condition against a steel counterface does not distinguish over any surface, which would necessarily have a value for the initial coefficient of friction in an unlubricated condition against a steel counterface.

Davidson 5,415,704

11. Claim 217 is rejected under 35 U.S.C. 102(b) as being anticipated by Davidson 5,415,704 (Davidson).

Davidson teaches a Cr-containing medical implant material containing Cr (col 3):

The invention provides surface hardened, abrasion resistant medical implants. The hardening methods may be applied to all currently used implant metals include AISI 316L stainless steel (i.e. Fe—Cr—Ni—Mo), Co—Cr—Mo (F75 or F799) and Ti-6Al-4V, and those alloys that may be contemplated as useful. While the methods

[emphasis added by examiner]

Davidson teaches a chromium coating and a means for increasing the initial hardness of the chromium coating (col 10, lines 11-50: Example 1). The claim does not distinguish over the teachings of Davidson.

Art Unit: 1742

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Davidson 5,415,704

13. Claims 1, 5-9, 16, 20-25, 35-43, 72-77, 90-93, 95-101, 104-108, 110-121, 125, 129-131 and 141-168 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davidson 5,415,704 (Davidson).

Davidson teaches a Cr-containing medical implant material containing Cr, as recited in claim 141 (col 3):

The invention provides surface hardened, abrasion resistant medical implants. The hardening methods may be applied to all currently used implant metals include AISI 316L stainless steel (i.e. Fe—Cr—Ni—Mo), Co—Cr—Mo (F75 or F799) and Ti-6Al-4V, and those alloys that may be contemplated as useful. While the methods

[emphasis added by examiner]

Davidson teaches treating the surface of the medical implant with an additive, including nitrogen, carbon-containing gases and oxygen, wherein the surface forms oxides and carbides as recited in instant claims 1, 90, 125 and 141 (col 2):

Art Unit: 1742

Standard nitriding, oxidizing, and carbonizing treatments for metals are available and known to persons skilled in the art. These methods use plasma, fluidized beds, molten salts, or nitrogen, oxygen, or carbon-containing gaseous environments at elevated temperatures to perform surface treatments. In these methods, diffusion of nitrogen, carbon, and oxygen into the metallic implant and the subsurface nucleation of nitrides, carbides, or oxides increases hardness and strengthens the metal to depths of 50 microns or more depending on gas concentration, time, temperature, and alloy composition. However, the formation of nitrides or carbides in

[emphasis added by examiner]

Davidson teaches that the hardness of the surface is increased from the initial hardness by the application of the additive (note rejection under 35 USC 112, second paragraph in paragraph 8a, above), as recited in instant claims 16-17, 19-28, 32-43, 55-66, 105-108, 110-121, 125, 129-131, and 153-168 (col 10, lines 11-50). Davidson teaches an amount of "X" (e.g. oxygen) in relation to chromium (also note rejection under 35 USC 112, second paragraph in paragraph 8b, above) that overlaps the amount of "X" instantly claimed, as recited in instant claims 8-10, 14-15, 47-48, 73-77, 95-101, 104-108 and 145-152 (col 7, lines 9-39 and col 10, lines 11-50). Davidson teaches that the resultant coating has increased abrasion resistance, enhanced fatigue strength, tension bending and hardness (col 3, lines 32-44).

Davidson fails to meet all the limitations of the instant claims in that Davidson does not explicitly teach the friction coefficients of friction (e.g. claims 1, 90 and 141) or the gradient of the chromium oxide/carbide on the surface (e.g. claims 1, 90, 125 and 141).

However, one of ordinary skill in the art at the time the invention was made would have considered the invention to have been obvious because the process steps taught by the reference are the same as the process steps recited in the claims (i.e. treating the surface with an additive

Art Unit: 1742

comprising oxygen and/or carbon (col 2, lines 33-46)) and therefore one of ordinary skill in the art would expect that the products resulting from the process taught by the reference would be the same as the product resulting from applicant's claimed process, including the product's coefficient of friction and chromium oxide/carbide gradient.

"Where the claimed and prior art products are identical or substantially identical in structure or composition or are produced by identical or substantially identical processes, a prima facie case of either anticipation or obviousness has been established, In re Best 195 USPQ 430, 433 (CCPA 1977). 'When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not.' In re Spada, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). Therefore, the prima facie case can be rebutted by evidence showing that the prior art products do not necessarily possess the characteristics of the claimed product. In re Best 195 USPQ 430, 433 (CCPA 1977)." see MPEP 2112.01. [emphasis added by examiner]

With respect to the specific concentration of X, one of ordinary skill in the art at the time the invention was made would have considered the invention to have been obvious because the concentration of X taught by the reference overlaps that of the instant claims, In re Malagari, 182 USPQ 549, and MPEP 2144.05.

Nakahama et al. 5,882,439

14. Claims 1-2, 4-10, 14-17, 19-28, 32-48, 55-66, 72-77 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakahama et al. 5,882,439 (Nakahama).

Nakahama teaches coating a Cr-containing alloy with an additive comprising chromium halide, such as CrCl_2 and CrF_2 (col 6, lines 17-18), wherein the chromium layer has improved mechanical properties and corrosion resistance, as recited in claims 1-2 and 4 (col 1, lines 9-13; col 3, lines 1-5; col 5, lines 8-15 and col 6, lines 51-63)). Nakahama teaches amounts of X (e.g. O, Cl, and F that overlap that of the instant claims (col 5, lines 5-12 and 32-55).

Nakahama fails to meet all the limitations of the instant claims in that Nakahama does not explicitly teach the coefficient of friction or the hardness of the layer (claims 1-2, 4-10, 14-17, 19-28, 32-48, 55-66, 72-77).

Art Unit: 1742

However, one of ordinary skill in the art at the time the invention was made would have considered the invention to have been obvious because the process steps taught by the reference are the same as the process steps recited in the claims (i.e. treating the surface with an additive comprising oxygen and/or carbon (col 2, lines 33-46)) and therefore one of ordinary skill in the art would expect that the products resulting from the process taught by the reference would be the same as the product resulting from applicant's claimed process, including the product's coefficient of friction and hardness.

"Where the claimed and prior art products are identical or substantially identical in structure or composition or are produced by identical or substantially identical processes, a prima facie case of either anticipation or obviousness has been established, In re Best 195 USPQ 430, 433 (CCPA 1977). 'When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not.' In re Spada, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). Therefore, the prima facie case can be rebutted by evidence showing that the prior art products do not necessarily possess the characteristics of the claimed product. In re Best 195 USPQ 430, 433 (CCPA 1977)." see MPEP 2112.01. [emphasis added by examiner]

With respect to the specific concentration of X, one of ordinary skill in the art at the time the invention was made would have considered the invention to have been obvious because the concentration of X taught by the reference overlaps that of the instant claims, In re Malagari, 182 USPQ 549, and MPEP 2144.05.

Davidson 5,676,701 in view of Sinderband 2,685,543

15. Claims 94, 102, 103, 109, 122-124, 126-128 and 132-140 are rejected under 35 U.S.C. 103(a) as being unpatentable over Davidson 5,676,701 (Davidson) in view of Sinderband 2,685,543 (Sinderband).

Davidson teaches and is applied as set forth above in paragraph 13.

Davidson fails to meet all the limitations of the instant claims in that Davidson does not explicitly teach use of the specific carbon containing gases claimed, including CO (claims 94, 126, 127 and 128).

Art Unit: 1742

Sinderband teaches the use of CO in the treatment atmosphere in chromatizing to create a hardened Cr-containing surface (col 11):

As an alternative carburizing procedure, the low carbon ferrous article is first packed in a retort and heated to a temperature of about 925° C. and a stream of a gaseous mixture of O₂, CO, CH₄, C₂H₆, and N₂ is passed through the retort for producing reactions causing the CO and hydrocarbons to break down almost completely to carbon, oxygen and hydrogen, the carbon depositing on and diffusing into the surface layer of the ferrous body forming a surface layer of high carbon content.

[emphasis added by examiner]

Sinderband teaches that the coating results in properties of high hardness and wear resistance (col 3, lines 2-6).

One of ordinary skill in the art at the time that the invention was made would have found the invention to be obvious because one of ordinary skill in the art would have been motivated to use the gaseous atmosphere of Sinderband as the carbon containing atmosphere of Davidson (col 2, lines 35-36) in order to provide Davidson with the desirable properties of high hardness and wear resistance, as taught in Sinderband (col 3, lines 2-6).

Allowable Subject Matter

16. Claims 3, 11-13, 18, 29-31, 49-54, 67-71 and 78-89 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Further, if these claims are rejected under 35 USC 112, second paragraph, in paragraph 8 above, those claims would be allowable if the rejection under 35 USC 112, second paragraph was overcome and the claims

Art Unit: 1742

were rewritten in independent form including all of the limitations of the base claim and any intervening claims.

A primary reason for allowance of claims 3, 11-13, 18, 29-31, 49-54, 67-71 and 78-89, under the above conditions, is that the prior art fails to teach or suggest, either alone or in combination, the method forming a lubricious outer surface comprising chromium wherein the claimed additive comprises sulfur, as instantly claimed.

Conclusion

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. Japanese Patent JP 360128269 A teaches a method of coating a titanium member with a hard chromium layer wherein the coating is activated by ion bombardment (abstract).

b. Japanese Patent JP 402297466 A teaches a method of forming a hard chromium layer on a printing hammer, wherein the layer is formed by a method including ion plating (abstract).

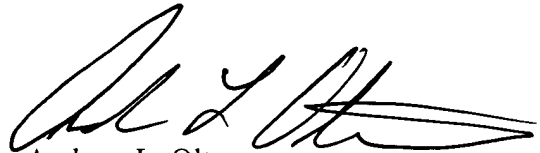
18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew L. Oltmans whose telephone number is 703-308-2594. The examiner can normally be reached 8:30-5:00 Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on 703-308-1146. The fax phone numbers for the

Art Unit: 1742

organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-873-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

A handwritten signature in black ink, appearing to read 'A. L. Oltmans', with a long horizontal flourish extending to the right.

Andrew L. Oltmans
Examiner
Art Unit 1742

April 17, 2003